

## Issue no. 6/2014: Poor responsiveness and performance? Check the recirculation air valve!

If performance problems in vehicles with petrol engines persist even after replacing the turbocharger, this may be due to a malfunctioning recirculation air valve (RAV). This valve is installed either directly on the turbocharger or in the pressure side area of the charge air line. Poor performance can be caused by a ruptured membrane on the inside, leaking control lines, or corroded plug contacts. With electronic valves, an entry is generally created in the engine control unit; checking the fault memory will save a lot of time in this case.

### PROACTIVE AGAINST TURBO LAG: THE RECIRCULATION AIR VALVE

The task of the recirculation air valve is to prevent a back-log of charge air as a result of load changes (gear shifts) and consequently the associated deceleration of the rotating assembly.

If the driver suddenly eases off the gas (throttle valve closes) at a high turbocharger speed, a high dynamic pressure is generated on the compressor side, which cannot escape. This counter pressure slows down the impeller drastically and leads to high mechanical loads

on the turbocharger and the closed throttle valve. Once the gear shift is completed (throttle valve opens), the turbocharger has to be brought up to speed again.

The RAV minimises this delay, also known as “turbo lag”, following load changes: it releases the accumulated charge air between the compressor side and the closed throttle valve via a bypass; once it has passed through the compressor, it is guided back into the intake section ahead of the turbocharger. This loss of pressure on the compressor side prevents a deceleration of the turbocharger. When the throttle valve opens, the RAV closes and the boost pressure increases immediately.

If the valve is damaged or malfunctioning, however, this results in poor responsiveness and might even lead to the turbocharger failing as a result of overload. We therefore recommend the following: if you notice a drop in performance, always check the RAV before replacing the turbocharger. Further tips for a precise root cause analysis in case of reduced performance can be found in our Technical Messenger 2/2014.

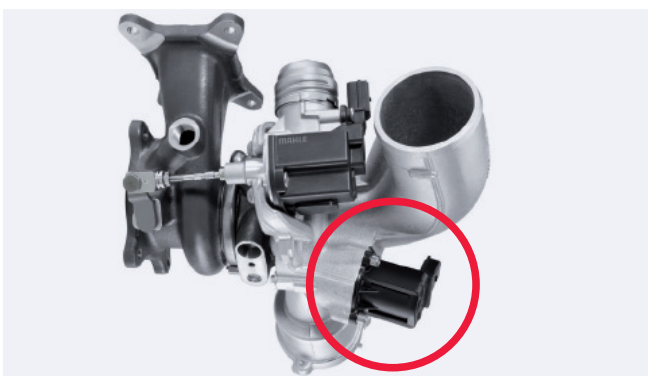


Figure 1: Electrically actuated RAV

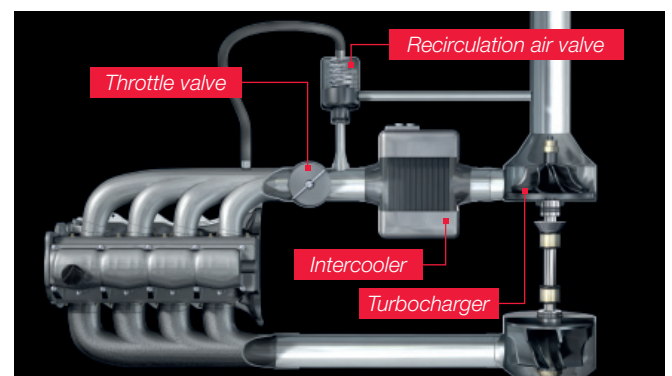


Figure 2: Pneumatically actuated RAV via negative pressure